

Report on Reconciliation of EIA-810/820 Information to the 2002 Manufacturing Energy Consumption Survey (MECS)

October 19, 2004

Introduction

We conducted the reconciliation of the refineries in two phases. The first phase was an overall survey assessment where we compared the active refineries in the 2002 MECS sample to a current 2004 file with the active and inactive refineries listed in the EIA-810/820 frame. During the second phase, we contacted approximately 30 refineries to resolve discrepancies in the reported data between the MECS and the EIA-810/820 survey. While Title 13 prohibits the release of any individual refinery data contained in MECS, we are providing summary information.

Overall Survey Assessment

The MECS is a sample of manufacturing establishments that is drawn from the Economic Census, and there are 116 active refineries in the MECS sample. There are 112 active refineries in the EIA-810/820 frame per the file we were given. There are 96 refineries out of the 116 active refineries in the MECS sample that matched to the active cases in the EIA-810/820 frame. This constitutes an approximate 83% match between the two frames.

We researched the 20 cases that differed between the two surveys. Of those 20, we found six are in the 2002 MECS sample, but are not in the EIA-810/820 frame. Five of these six refineries were among the approximately 30 refineries that we contacted during phase two of the project. Our conversations with these respondents revealed that two of them had reported having refinery and non-refinery activities at the locations. All five had either waxes or lubricating oils as their primary shipments, and only one reported to us that they were shipping motor gas, but it was secondary to lubricating oils.

As mentioned above, we were comparing a 2002 sample to a current 2004 file. This appears to account for the fact that an additional two of the 20 unmatched cases are in the 2002 MECS sample but the EIA-810/820 frame has them listed as inactive. We also found that 12 of the 20 unmatched cases are in the MECS sample, and the EIA-810/820 has 2002 data from the refinery but does not have the refinery listed in their frame as either being active or inactive.

In phase two, we called approximately 30 MECS establishments for which we identified data discrepancies between the MECS and the EIA-810/820. In

general, we concentrated on the larger refineries first and ended with the smaller ones. We told the MECS respondent of the discrepancy(s) and then asked the MECS respondent if he/she knew whom the EIA-810/820 survey contact was for their establishment. We gave them the EIA-810/820 contact if they did not know who it was. We then asked the MECS respondent to speak with the EIA-810/820 respondent to resolve the discrepancy(s) for that establishment. In most cases, the MECS respondent spoke directly to the EIA-810/820 respondent, but in some cases we did speak with the EIA-810/820 respondent. One general result we found was that in only three total cases, out of all the refineries, did both the MECS and EIA-810/820 surveys share the same respondent. More often than not, the 30 MECS respondents had not even heard of the EIA-810/820 survey much less know who the contact was. However, when we then told them who the contact was, they would tell us that person was in the next office or just down the hall.

Diesel, Distillate and Motor Gas

It was very difficult to match the diesel, distillate, and motor gas on the surveys. For example, there are only two refineries in the entire EIA-810 frame that reported using motor gas as a fuel, but seven out of the 30 refineries we contacted about motor gas on the MECS used it as a fuel for on-site vehicles.

Only seven of the refineries on both surveys could be matched as using diesel, distillate, or a combination of both. In four of the seven cases, we found that the refineries had reported their diesel fuel or a combination of their diesel/distillate fuel as just distillate in the EIA-810 survey. Of the 30 refineries we contacted, 19 used diesel as a fuel in onsite vehicles, heavy machinery, generators, and compressors. Only 14 of the 30 refineries we spoke to used distillate as a fuel in their refinery and reported it on the MECS.

As a side note, one respondent explained the difference between the two surveys was because they used some of their distillate fuel to flush their pipes. Since this is not a fuel use, it would not be counted on the MECS.

Hydrogen

Hydrogen has a similar story as above; there were no matches between the surveys for hydrogen being used as a fuel. Only one refinery on the EIA-810 frame reported using hydrocarbons/hydrogen/oxygenates as a fuel, and we cannot conclusively say whether the fuel being used is hydrogen. Of the 30 refineries we spoke with, seven purchased, produced, and consumed hydrogen at the refinery. All seven consumed the hydrogen as a fuel, and four also used some of their hydrogen as a feedstock. The hydrogen that was being used as a feedstock was not reported on the MECS.

Liquid Petroleum Gases (LPG)

There were no other liquefied petroleum gases (LPG), natural gas liquids (NGL), or mixtures of ethane, propane, and butane in the refineries we contacted. So for the ease of explanation in this write-up, individual amounts of ethane, propane, and butane are combined and considered as a whole as liquefied petroleum gases (LPG). We verified the LPG fuel usage with 30 refineries on the 2002 MECS, and 16 of the 30 refineries burn ethane, propane, or butane as a fuel. Of those 16 refineries, ten indicated that the LPG volumes listed as a fuel on the EIA-810 survey either matched or “fell in line with” production volumes. Two of the respondents told us that they would only burn propane and butane when natural gas prices are too expensive for extended periods of time.

Residual Fuel

Only 13 of the 30 refineries we contacted used residual fuel oil as a fuel. Virtually all, 12 of those 13, that reported using residual fuel on the MECS reported the same residual fuel amount on the EIA 810 survey. We spoke to the EIA-810 respondent that did not match, and that respondent indicated that the MECS residual volume was correct. She indicated that the refinery had been bought out in 2002, and they had started using a different accounting report. She misinterpreted the report and put the residual fuel use in the wrong column on the EIA-810 survey. We were told that it has since been corrected on the EIA 810 survey.

Three respondents we contacted indicated to us that they do not burn residual fuel anymore because of mandates within their organization to use cleaner burning fuels.

Still Gas or Waste Gas

As mentioned previously, there are 96 refineries that matched between the surveys. There are 57 of the 96 that reported equivalent still gas volumes. We asked the same 30 refineries to verify their reported still gas volumes, and ten of those indicated that the differences in the still gas volumes was because of response errors.

About half of the ten respondents identified the error as a MECS response error. They explained that because their consumption meter for their processes is after the point where the waste gas stream combines with the natural gas stream, the consumption for both are added together. The MECS respondents were incorrectly putting the sum of the consumption for both in the natural gas consumption answer instead of backing out their natural gas purchases.

The other half of those ten respondents indicated that response errors were present with the EIA-810 survey data. Respondents explained that for the EIA-810, they are “netting out” the still gas volumes. In this case, establishments produce a certain amount of waste gas, consume some of what is produced, and sell the difference. Only the sold amounts are being reported on the EIA-810 survey as shipments.

Petroleum Coke

The petroleum coke fuel use matched very well between the 2002 MECS and the EIA-810 survey data. Of the 30 refineries contacted, 22 matched with respect to the volume of their petroleum coke fuel use.

One of the eight respondents that did not match gave us an explanation as to why there was a difference. In this case, the MECS respondent spoke with the EIA-810 respondent about the difference in the data. He learned that the EIA-810 respondent was calculating the petroleum coke fuel incorrectly. The EIA-810 respondent was using a 50 year-old method for calculating the petroleum coke fuel by which a set percentage is applied to the inputs instead of calculating the actual heat content of the petroleum coke. That is why the petroleum coke fuel use volume on the EIA-810 survey was underestimated.

Purchased Electricity, Natural Gas, and Steam

Purchased electricity, natural gas, and steam also matched very well between the 2002 MECS and the EIA-820 survey data. Of the 30 refineries we contacted, 100 percent matched electricity and steam purchases data. Twenty-one had similar natural gas purchases data. In four cases where the natural gas purchases did not match, we learned that the higher volumes on the MECS were correct. Those refineries were purchasing and using natural gas to produce hydrogen on-site in their catalytic reforming units.

Summary and General Conclusions

Our research indicates that the EIA-810 survey may be missing some onsite fuel use that is not used in the refinery process. This onsite fuel use is typically diesel and motor gas used to power onsite vehicles, heavy machinery, generators, and compressors.

All three of the surveys have reporting errors, but from our research it seems that the MECS purchased fuel data is more consistent with the purchased fuel data on the EIA-820 survey. However, the consumed fuel data on the MECS is not as consistent with the EIA-810 data. There are several factors that may contribute to this. Because the profit margins are so thin, each refinery seems to have their own internal volumetric accounting report that tracks everything

at the refinery, including fuel consumption data. Typically, the purchased fuels data would be summed and copied from invoices, whereas the consumed fuels are from an internal volumetric accounting report. Another contributing factor may relate to the fact that very few refineries have the same respondent for the MECS and EIA-810/820 surveys. It is possible that the consumed fuels do not match as well because the respondents at a particular refinery are usually separate people that interpret the internal volumetric accounting report differently or have different versions of the report.